Title: **JP09015547A2: PRODUCTION METHOD OF LIQUID CRYSTAL DISPLAY DEVICE AND APPARATUS FOR PRODUCTION USED FOR THE METHOD**

Country: JP Japan
Kind: A2 Document Laid open to Public inspection (See also: JP03113936B2)

High Resolution

Inventor: **FUJISAWA MASATO;**

Assignee: **ADVANCED DISPLAY:KK**
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Published / Filed: **1997-01-17** / 1995-06-30

Application Number: **JP1995000165339**

IPC Code: Advanced: G02F 1/13; G09F 9/00;
Core: more...
IPC-7: G02F 1/13; G09F 9/00;

ECLA Code: None

Priority Number: 1995-06-30 **JP1995000165339**

INPADOC Legal Status: None Get Now: Family Legal Status Report

Family:

PDF	Publication	Pub. Date	Filed	Title
☑	JP09015547A2	1997-01-17	1995-06-30	PRODUCTION METHOD OF LIQUID CRYSTAL DISPLAY DEVICE AND APPARATUS FOR PRODUCTION USED FOR THE METHOD
☑	JP03113936B2	2000-12-04	1995-06-30	
2 family members shown above				

Other Abstract Info: DERABS G97-136259 DERG97-136259

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-015547
(43)Date of publication of application : 17.01.1997

(51)Int.Cl. G02F 1/13
G09F 9/00

(21)Application number : 07-165339
(22)Date of filing : 30.06.1995

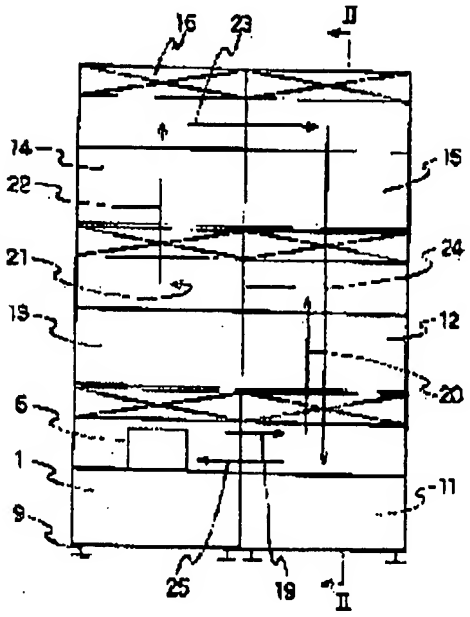
(71)Applicant : ADVANCED DISPLAY:KK
(72)Inventor : FUJISAWA MASATO

(54) PRODUCTION METHOD OF LIQUID CRYSTAL DISPLAY DEVICE AND APPARATUS FOR PRODUCTION USED FOR THE METHOD

(57)Abstract:

PURPOSE: To save space, to suppress the degradation in cleanliness and to reduce the cost of the ancillary work for electric power by communicating the treating units installed adjacently in a clean room with each other and three-dimensionally arranging these plural treating units.

CONSTITUTION: The inside of an apparatus for production is segmented to six spaces and two blocks are formed for each one stage. The three stages are stacked in a perpendicular direction. The block of the lowermost stage is constituted as a loader and unloader section 1 where cassettes 6 are loadable. The other six blocks are formed as the treating units 11 to 15. The loader and unloader section 1 and the treating units 11 to 15 are constituted by communicating the two treating units adjacent along the perpendicular direction or horizontal direction with each other. The respective upper parts of the loader and unloader section 1 and the treating units 11 to 15 are provided with filter units 16 for air cleaning. While glass substrates are subjected to the treatments, the clean air is supplied to the treating units 11 to 15 and the glass substrates are moved in the perpendicular or horizontal direction to the next treating after the completion of the treatments in the treating units.



LEGAL STATUS

[Date of request for examination] 29.10.1998

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3113936

[Date of registration] 29.09.2000

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]
[Claim 1] At least two or more steps have been arranged in three dimensions, and used the manufacturing installation in the interior of a clean room which comes to be open for free passage of between a perpendicular direction or two processing units which met horizontally and adjoined. Are the process of a liquid crystal display and it sets to at least one processing unit. As opposed to all the processing unit while having processed to the glass substrate Supply the air defecated from the upper part and the air inside a processing unit is discharged from a lower part to the clean room exterior. And the process of the liquid crystal display characterized by making said glass substrate move to the processing unit for performing the next processing perpendicularly or horizontally after the processing in said processing unit is completed.
[Claim 2] the manufacturing installation for liquid crystal displays which has two or more processing units arranged in the interior of a clean room -- it is -- (1) -- said processing unit At least two or more steps are arranged in three dimensions, and between a perpendicular direction or two processing units which met horizontally and adjoined is opened for free passage. and the upper part of the processing unit of the maximum upper case opens wide -- having -- **** -- (2) -- in each upper part of said processing unit the filter unit for making it clarification establishes the air inside a processing unit -- having -- **** -- (3) -- to the back side of said processing unit The jet pipe which is open for free passage to each processing unit is arranged, and between said processing units is arranged in the interior of (4) this jet pipe free [migration of the handling robot for conveying a glass substrate]. (5) Manufacturing installation for liquid crystal displays characterized by coming to connect with the tooth-back lower part of said jet pipe the communicating tube which makes the interior of a jet pipe open for free passage to the clean room exterior.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the manufacturing installation used for the process of a liquid crystal display; and it. It is related with the manufacturing installation used for the process of a liquid crystal display and it which can attain space-saving-ization by configurating two or more processing units in more detail.
[0002]
[Description of the Prior Art] Conventionally, when manufacturing a liquid crystal display, two or more processes, such as a photography process, are processed to the glass substrate.
[0003] Drawing 3 is the transverse-plane explanatory view of the manufacturing installation for manufacturing the conventional liquid crystal display, two or more processing units 32-34 are arranged horizontally, and this manufacturing installation is constituted by opening two adjoining processing units for free passage mutually.
[0004] In drawing 3 , 31 possesses the handling robot (not shown) for taking out the glass substrate in the cassette installation section and a cassette in the loader section. This handling robot has come to be able to carry out horizontal migration of each back side of the processing units 32-34.
[0005] Here, 32 is a scrubber and a dryer part, the foreign matter on the front face of a glass substrate is removed, desiccation of a glass substrate is also performed further, and 33 is the coater section and the processing units 32-34 carry out rotation spreading of the photopolymer on a glass substrate, 34 is the BEKU section, and they have the hot plate, and stiffen the photopolymer on a glass substrate with this hot plate.
[0006] 35 is the unloader section and possesses the handling robot (not shown) which contains a glass substrate for the glass substrate which process processing finished in the cassette installation section and a cassette like the loader section.
[0007] 36 and 37 are the cassettes which contain a glass substrate, and 38 is transparence covering for protection against dust.
[0008] 39 is level ****** of a unit, i.e., the adjustment bolt for height control.
[0009] Below, the process of the liquid crystal display which used the manufacturing installation of drawing 3 is explained in order.
[0010] First, the cassette 36 which contained the glass substrate sent, a last process, for example, a membrane formation process, just before coming to said manufacturing installation, is laid in the cassette installation base of the loader section 31.
[0011] It takes out at a time one glass substrate in the cassette 36 laid in the next by the handling robot, and conveys to a scrubber and a dryer part 32.
[0012] In this scrubber and dryer part 32, a glass substrate is first grasped by the chuck (not shown) in the scrubber section, subsequently, for example, a mohair brush etc. removes the foreign matter on a glass substrate, and a glass substrate is dried by that after dryer part.
[0013] Next, rotation spreading of the photopolymer is carried out for the dried glass substrate on delivery and a glass substrate to the coater section 33 according to the conveyance device in equipment at about 5000A in thickness.
[0014] Furthermore, the glass substrate which applied the photopolymer is BEKU and stiffened with

delivery, a hot plate, etc. to the BEKU section 34.
[0015] Finally, it contains at a time one glass substrate which hardening completed in a cassette 37 by delivery and the handling robot to the unloader section 35.
[0016]
[Problem(s) to be Solved by the Invention] However, in the process of said liquid crystal display, since the glass substrate was conveyed horizontally and it has processed in the sequential-processing units 32-34, there is a problem of the following (1) - (3).
[0017] (1) In the clean room in which said manufacturing installation was held, the occupancy area of the manufacturing installation concerned becomes large, consequently a clean room is enlarged, and the running cost of a clean room increases in connection with it.
[0018] (2) Since it is divided only with protection-against-dust covering, the organic component used in each unit diffuses the periphery section of said manufacturing installation in a clean room, and it reduces the cleanliness of the clean room concerned.
[0019] (3) Since each processing unit is constituted horizontally (for example, in order to connect an exhaust pipe, the source of power for exhaust air, etc. for every unit in connection construction of an exhaust air facility), power appurtenant work becomes expensive.
[0020] By being made in order to solve this problem, and arranging each processing unit in three dimensions, this invention attains space-saving-ization, moreover controls the fall of cleanliness, and aims at offering the manufacturing installation used for the process of a liquid crystal display and it which can attain low cost-ization of power appurtenant work further.
[0021]
[Means for Solving the Problem] At least two or more steps have been arranged in three dimensions, and the manufacturing installation in the interior of a clean room which comes to be open for free passage of between a perpendicular direction or two processing units which met horizontally and adjoined was used for the process of the liquid crystal display of this invention. Are the process of a liquid crystal display and it sets to at least one processing unit. As opposed to all the processing unit while having processed to the glass substrate Supply the air defecated from the upper part and the air inside a processing unit is discharged from a lower part to the clean room exterior. And after the processing in said processing unit is completed, it is characterized by making said glass substrate move to the processing unit for performing the next processing perpendicularly or horizontally.
[0022] Moreover, the manufacturing installation for the liquid crystal displays of this invention the manufacturing installation for liquid crystal displays which has two or more processing units arranged in the interior of a clean room -- it is -- (1) -- said processing unit At least two or more steps are arranged in three dimensions, and between a perpendicular direction or two processing units which met horizontally and adjoined is opened for free passage. The filter unit for making air inside a processing unit into clarification is prepared in each upper part of said processing unit. and the upper part of the processing unit of the maximum upper case opens wide -- having -- **** -- (2) -- (3) The jet pipe which is open for free passage to each processing unit is arranged in the back side of said processing unit. (4) -- the handling robot for conveying a glass substrate arranges between said processing units in the interior of this jet pipe free [migration] -- having -- **** -- (5) -- in the tooth-back lower part of said jet pipe It is characterized by coming to connect the communicating tube which makes the interior of a jet pipe open for free passage to the clean room exterior.
[0023]
[Function] According to this invention, the occupancy area of the liquid crystal display concerned is sharply reducible by arranging two or more processing units in three dimensions.
[0024] Moreover, when in-and-out of the air of each processing unit is seen, after making air defecate by passing a filter unit first, the processing unit of the maximum upper case is supplied and, subsequently a part of supplied air [at least] is supplied to the processing unit of the lower berth through a filter unit from a lower part. All the air discharged from the processing unit of the bottom etc. is discharged to the clean room exterior through the communicating tube after it. Therefore, air of a clean room is not soiled.
[0025]
[Example] Below, the manufacturing installation used for the process of the liquid crystal display of this invention and it is explained to a detail, referring to a drawing. The mimetic diagram in which drawing 1 shows the configuration of one example of the manufacturing installation of this invention, and drawing 2

are the II-II line sectional views of drawing 1 .

[0026] The interior roughly divides the manufacturing installation for liquid crystal displays shown in drawing 1 -2, and it is divided to six tooth spaces. That is, three steps of two partitions are perpendicularly constituted in piles per step. Among these partitions, the partition of the left column bottom in drawing 1 is the automatic-loader-and-unloader section 1, and has the structure where a cassette 6 can be laid. Other five partitions are the processing units 11-15, and are later mentioned about the detail of each processing unit.

[0027] Moreover, between a perpendicular direction or two processing units which met horizontally and adjoined (or between the automatic-loader-and-unloader section and processing units) is opened for free passage, and, as for the automatic-loader-and-unloader section 1 and the processing units 11-15, the upper part of the processing units 14 and 15 of the maximum upper case is opened wide. The filter unit 16 for making into clarification air supplied to the interior of a processing unit is formed in the automatic-loader-and-unloader section 1 and each upper part of the processing units 11-15.

[0028] And as shown in drawing 2 , each of the automatic-loader-and-unloader section 1 and the processing units 11-15 and the jet pipe 17 open for free passage are formed in the back side of said automatic-loader-and-unloader section 1 and the processing units 11-15. The handling robot 10 for conveying a glass substrate is arranged in this jet-pipe 17 interior movable in between said automatic-loader-and-unloader section 1 and the processing units 11-15.

[0029] The communicating tube 18 for making the jet-pipe 17 interior open for free passage to the clean room exterior is formed in the tooth-back lower part of said jet pipe 17.

[0030] By carrying out vacuum adsorption of the glass substrate using the vacuum chuck which can move now about a perpendicular direction and horizontal both in the interior of a jet pipe 17, and was moreover prepared in the proper location of the elastic robot arm A, the handling robot 10 is constituted so that migration of the glass substrate between each processing unit may be enabled.

[0031] Specifically, the following units are arranged in said processing units 11-15, respectively.

[0032] 11 is the scrubber section and removes the foreign matter on a glass substrate.

[0033] 12 is a dryer part, is a hot plate etc., and dries a glass substrate.

[0034] 13 is the photopolymer spreading section (coater section), and applies a photopolymer with a thickness of about 5000A on a glass substrate using the centrifugal force produced when carrying out high-speed rotation of the glass substrate.

[0035] 14 is the BEKU section, and BEKU and stiffens the photopolymer applied to the glass substrate on the hot plate.

[0036] 15 is the buffer section and can add a required processing unit with the specification of the liquid crystal display produced. As a processing unit added to this buffer section 15, the unit for removing a glass substrate etc. is raised to the cassette further used at another high-temperature-service hot plate unit or degree process other than said BEKU section 14 when postbake is required.

[0037] Moreover, it is attached in the upper parts, such as each processing unit, and the filter unit 16 has become the specification which can maintain the cleanliness inside a processing unit at predetermined criteria, such as a class 10. Especially, as a filter unit 16, if a HEPA (High Efficiency Particulate Absolute) filter is used, high cleanliness can be attained. And when using a HEPA filter, since the wind speed is blowing off in a second in about 0.4-0.5m /, and an air curtain is made at the inlet port (posterior part opening which faces a jet pipe 17) of each processing unit, invitation of exterior air can usually be prevented.

[0038] A jet pipe 17 exhausts the air containing the organic component contained in drugs inside each processing unit, such as MMP (Methyl 3-methoxy propionate) thinner or a resist ingredient, to the clean room exterior through the communicating tube 18. Moreover, the duty as covering for the handling robot 10 has also achieved the jet pipe 17.

[0039] In addition, 9 is the adjustment bolt of level ****** of a unit.

[0040] Below, the process of the liquid crystal display using the manufacturing installation shown in drawing 1 -2 is explained.

[0041] First, the cassette 6 which contained the glass substrate sent from the last process, for example, a membrane formation process, is laid to the cassette installation section of the automatic-loader-and-unloader section 1.

[0042] The laid glass substrate of the cassette 6 interior is conveyed in the direction of an arrow head

19 by the handling robot 10, and is sent to the scrubber section 11.
[0043] Conveyance actuation of the glass substrate by the handling robot 10 A glass substrate specifically lengthens (1) robot arm A caudad. (2) Its (3) robot arm A which makes the robot arm A carry out vacuum adsorption of the glass substrate is drawn in. Move a glass substrate to the interior of a jet pipe 17 from the partition of the automatic-loader-and-unloader section 1. (4) It is performed by the procedure of lengthening (5) robot arm A, canceling the after vacuum adsorption, and making a glass substrate lay in the scrubber section 11 interior of moving the handling robot 10 to the direction of an arrow head 19, i.e., the back of the scrubber section 11.
[0044] In the scrubber section 11, a mohair brush etc. removes the foreign matter on a glass substrate, subsequently a glass substrate is moved in the direction of an arrow head 20 like the above-mentioned conveyance actuation using the handling robot 10, and it conveys to a dryer part 12.
[0045] Next, a glass substrate is completely dried with a hot plate etc. by the dryer part 12, and it is made to move in the direction of an arrow head 21 like the above-mentioned conveyance actuation using the handling robot 10, and conveys to the coater section 13.
[0046] Furthermore, it is a centrifugal force about a photopolymer on a glass substrate in the coater section 13, for example, applies to about 5000A in thickness.
[0047] Using the handling robot 10, like the above-mentioned conveyance actuation, it is made to move in the direction of an arrow head 22, and the glass substrate which spreading completed is conveyed to the BEKU section 14.
[0048] In this BEKU section 14, the photopolymer on a glass substrate is BEKU and stiffened with a hot plate etc.
[0049] Above, a series of manufacture processings in the manufacturing installation of drawing 1 are completed. The glass substrate which carried out the completion of manufacture is conveyed by the handling robot 10 in order of arrow heads 23, 24, and 25, and is again contained in the cassette 6 of the automatic-loader-and-unloader section 1 by him.
[0050] In addition, although the drugs which contained the organic component in each processing unit are used as mentioned above while having performed each processing to the glass substrate As opposed to said all processing units 11-15 and the automatic-loader-and-unloader section 1 With the blower (not shown) in which the air defecated by the filter unit 16 from the upper part was supplied, and the air inside a processing unit was prepared from the lower part to the jet-pipe 17 interior For example, since it is made to exhaust by about [-40--80Pa] exhaust gas pressure and air is discharged to the clean room exterior through a jet pipe 17 and the communicating tube 18, an organic component etc. is not spread inside a clean room.
[0051] Moreover, although said especially example explained the process of a liquid crystal display including a photography process, it cannot be overemphasized by changing suitably the number of processing units, arrangement, especially a number of stages, etc. also about a process including the process which this invention is not limited to this and needs the processing unit of many, such as wet down stream processing or a glass substrate cure process, that it can carry out.
[0052]
[Effect of the Invention] As stated above, it is exhausting using the jet pipe which has arranged each processing unit in three dimensions in this invention, and was arranged in the back side of a processing unit. Thereby, the following effectiveness is acquired.
[0053] (1) Since the occupancy area of the equipment in a clean room can contract sharply, a clean room can also be miniaturized, consequently the running cost of a clean room can be reduced.
[0054] (2) Since each processing unit is exhausted with the jet pipe, an organic component is not spread in a clean room and the fall of defecation of a clean room can be controlled.
[0055] (3) Since each processing unit can be made into a fixed dimension and a standardization can be attained so to speak, the price of a manufacturing installation can be made cheap.
[0056] (4) If only one source of power for exhaust air of a blower etc. is connected to a jet pipe since each processing unit is arranged at the stereo, and the back side of each processing unit is connected to the common jet pipe in secondary incidental power construction and connection construction of the exhaust air facility for specifically exhausting an organic component, since the exhaust air unit of all processing units will become possible, the cost of construction becomes cheap.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the manufacturing installation used for the process of a liquid crystal display, and it. It is related with the manufacturing installation used for the process of a liquid crystal display and it which can attain space-saving-ization by configurating two or more processing units in more detail.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, when manufacturing a liquid crystal display, two or more processes, such as a photography process, are processed to the glass substrate.
[0003] Drawing 3 is the transverse-plane explanatory view of the manufacturing installation for manufacturing the conventional liquid crystal display, two or more processing units 32-34 are arranged horizontally, and this manufacturing installation is constituted by opening two adjoining processing units for free passage mutually.
[0004] In drawing 3 , 31 possesses the handling robot (not shown) for taking out the glass substrate in the cassette installation section and a cassette in the loader section. This handling robot has come to be able to carry out horizontal migration of each back side of the processing units 32-34.
[0005] Here, 32 is a scrubber and a dryer part, the foreign matter on the front face of a glass substrate is removed, desiccation of a glass substrate is also performed further, and 33 is the coater section and the processing units 32-34 carry out rotation spreading of the photopolymer on a glass substrate, 34 is the BEKU section, and they have the hot plate, and stiffen the photopolymer on a glass substrate with this hot plate.
[0006] 35 is the unloader section and possesses the handling robot (not shown) which contains a glass substrate for the glass substrate which process processing finished in the cassette installation section and a cassette like the loader section.
[0007] 36 and 37 are the cassettes which contain a glass substrate, and 38 is transparence covering for protection against dust.
[0008] 39 is level ****** of a unit, i.e., the adjustment bolt for height control.
[0009] Below, the process of the liquid crystal display which used the manufacturing installation of drawing 3 is explained in order.
[0010] First, the cassette 36 which contained the glass substrate sent, a last process, for example, a membrane formation process, just before coming to said manufacturing installation, is laid in the cassette installation base of the loader section 31.
[0011] It takes out at a time one glass substrate in the cassette 36 laid in the next by the handling robot, and conveys to a scrubber and a dryer part 32.
[0012] In this scrubber and dryer part 32, a glass substrate is first grasped by the chuck (not shown) in the scrubber section, subsequently, for example, a mohair brush etc. removes the foreign matter on a glass substrate, and a glass substrate is dried by that after dryer part.
[0013] Next, rotation spreading of the photopolymer is carried out for the dried glass substrate on delivery and a glass substrate to the coater section 33 according to the conveyance device in equipment at about 5000A in thickness.
[0014] Furthermore, the glass substrate which applied the photopolymer is BEKU and stiffened with delivery, a hot plate, etc. to the BEKU section 34.
[0015] Finally, it contains at a time one glass substrate which hardening completed in a cassette 37 by delivery and the handling robot to the unloader section 35.

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EFFECT OF THE INVENTION

[Effect of the Invention] As stated above, it is exhausting using the jet pipe which has arranged each processing unit in three dimensions in this invention, and was arranged in the back side of a processing unit. Thereby, the following effectiveness is acquired.
[0053] (1) Since the occupancy area of the equipment in a clean room can contract sharply, a clean room can also be miniaturized, consequently the running cost of a clean room can be reduced.
[0054] (2) Since each processing unit is exhausted with the jet pipe, an organic component is not spread in a clean room and the fall of defecation of a clean room can be controlled.
[0055] (3) Since each processing unit can be made into a fixed dimension and a standardization can be attained so to speak, the price of a manufacturing installation can be made cheap.
[0056] (4) If only one source of power for exhaust air of a blower etc. is connected to a jet pipe since each processing unit is arranged at the stereo, and the back side of each processing unit is connected to the common jet pipe in secondary incidental power construction and connection construction of the exhaust air facility for specifically exhausting an organic component, since the exhaust air unit of all processing units will become possible, the cost of construction becomes cheap.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the process of said liquid crystal display, since the glass substrate was conveyed horizontally and it has processed in the sequential-processing units 32-34, there is a problem of the following (1) - (3).
[0017] (1) In the clean room in which said manufacturing installation was held, the occupancy area of the manufacturing installation concerned becomes large, consequently a clean room is enlarged, and the running cost of a clean room increases in connection with it.
[0018] (2) Since it is divided only with protection-against-dust covering, the organic component used in each unit diffuses the periphery section of said manufacturing installation in a clean room, and it reduces the cleanliness of the clean room concerned.
[0019] (3) Since each processing unit is constituted horizontally (for example, in order to connect an exhaust pipe, the source of power for exhaust air, etc. for every unit in connection construction of an exhaust air facility), power appurtenant work becomes expensive.
[0020] By being made in order to solve this problem, and arranging each processing unit in three dimensions, this invention attains space-saving-ization, moreover controls the fall of cleanliness, and aims at offering the manufacturing installation used for the process of a liquid crystal display and it which can attain low cost-ization of power appurtenant work further.

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MEANS

[Means for Solving the Problem] At least two or more steps have been arranged in three dimensions, and the manufacturing installation in the interior of a clean room which comes to be open for free passage of between a perpendicular direction or two processing units which met horizontally and adjoined was used for the process of the liquid crystal display of this invention. Are the process of a liquid crystal display and it sets to at least one processing unit. As opposed to all the processing unit while having processed to the glass substrate Supply the air defecated from the upper part and the air inside a processing unit is discharged from a lower part to the clean room exterior. And after the processing in said processing unit is completed, it is characterized by making said glass substrate move to the processing unit for performing the next processing perpendicularly or horizontally.
[0022] Moreover, the manufacturing installation for the liquid crystal displays of this invention the manufacturing installation for liquid crystal displays which has two or more processing units arranged in the interior of a clean room -- it is -- (1) -- said processing unit At least two or more steps are arranged in three dimensions, and between a perpendicular direction or two processing units which met horizontally and adjoined is opened for free passage. The filter unit for making air inside a processing unit into clarification is prepared in each upper part of said processing unit. and the upper part of the processing unit of the maximum upper case opens wide -- having -- **** -- (2) -- (3) The jet pipe which is open for free passage to each processing unit is arranged in the back side of said processing unit. (4) -- the handling robot for conveying a glass substrate arranges between said processing units in the interior of this jet pipe free [migration] -- having -- **** -- (5) -- in the tooth-back lower part of said jet pipe It is characterized by coming to connect the communicating tube which makes the interior of a jet pipe open for free passage to the clean room exterior.

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OPERATION

[Function] According to this invention, the occupancy area of the liquid crystal display concerned is sharply reducible by arranging two or more processing units in three dimensions.
[0024] Moreover, when in-and-out of the air of each processing unit is seen, after making air defecate by passing a filter unit first, the processing unit of the maximum upper case is supplied and, subsequently a part of supplied air [at least] is supplied to the processing unit of the lower berth through a filter unit from a lower part. All the air discharged from the processing unit of the bottom etc. is discharged to the clean room exterior through the communicating tube after it. Therefore, air of a clean room is not soiled.

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EXAMPLE

[Example] Below, the manufacturing installation used for the process of the liquid crystal display of this invention and it is explained to a detail, referring to a drawing. The mimetic diagram in which drawing 1 shows the configuration of one example of the manufacturing installation of this invention, and drawing 2 are the II-II line sectional views of drawing 1 .

[0026] The interior roughly divides the manufacturing installation for liquid crystal displays shown in drawing 1 -2, and it is divided to six tooth spaces. That is, three steps of two partitions are perpendicularly constituted in piles per step. Among these partitions, the partition of the left column bottom in drawing 1 is the automatic-loader-and-unloader section 1, and has the structure where a cassette 6 can be laid. Other five partitions are the processing units 11-15, and are later mentioned about the detail of each processing unit.

[0027] Moreover, between a perpendicular direction or two processing units which met horizontally and adjoined (or between the automatic-loader-and-unloader section and processing units) is opened for free passage, and, as for the automatic-loader-and-unloader section 1 and the processing units 11-15, the upper part of the processing units 14 and 15 of the maximum upper case is opened wide. The filter unit 16 for making into clarification air supplied to the interior of a processing unit is formed in the automatic-loader-and-unloader section 1 and each upper part of the processing units 11-15.

[0028] And as shown in drawing 2 , each of the automatic-loader-and-unloader section 1 and the processing units 11-15 and the jet pipe 17 open for free passage are formed in the back side of said automatic-loader-and-unloader section 1 and the processing units 11-15. The handling robot 10 for conveying a glass substrate is arranged in this jet-pipe 17 interior movable in between said automatic-loader-and-unloader section 1 and the processing units 11-15.

[0029] The communicating tube 18 for making the jet-pipe 17 interior open for free passage to the clean room exterior is formed in the tooth-back lower part of said jet pipe 17.

[0030] By carrying out vacuum adsorption of the glass substrate using the vacuum chuck which can move now about a perpendicular direction and horizontal both in the interior of a jet pipe 17, and was moreover prepared in the proper location of the elastic robot arm A, the handling robot 10 is constituted so that migration of the glass substrate between each processing unit may be enabled.

[0031] Specifically, the following units are arranged in said processing units 11-15, respectively.

[0032] 11 is the scrubber section and removes the foreign matter on a glass substrate.

[0033] 12 is a dryer part, is a hot plate etc., and dries a glass substrate.

[0034] 13 is the photopolymer spreading section (coater section), and applies a photopolymer with a thickness of about 5000A on a glass substrate using the centrifugal force produced when carrying out high-speed rotation of the glass substrate.

[0035] 14 is the BEKU section, and BEKU and stiffens the photopolymer applied to the glass substrate on the hot plate.

[0036] 15 is the buffer section and can add a required processing unit with the specification of the liquid crystal display produced. As a processing unit added to this buffer section 15, the unit for removing a glass substrate etc. is raised to the cassette further used at another high-temperature-service hot plate unit or degree process other than said BEKU section 14 when postbake is required.

[0037] Moreover, it is attached in the upper parts, such as each processing unit, and the filter unit 16 has become the specification which can maintain the cleanliness inside a processing unit at

predetermined criteria, such as a class 10. Especially, as a filter unit 16, if a HEPA (High Efficiency Particulate Absolute) filter is used, high cleanliness can be attained. And when using a HEPA filter, since the wind speed is blowing off in a second in about 0.4-0.5m /, and an air curtain is made at the inlet port (posterior part opening which faces a jet pipe 17) of each processing unit, invitation of exterior air can usually be prevented.

[0038] A jet pipe 17 exhausts the air containing the organic component contained in drugs inside each processing unit, such as MMP (Methyl 3-methoxy propionate) thinner or a resist ingredient, to the clean room exterior through the communicating tube 18. Moreover, the duty as covering for the handling robot 10 has also achieved the jet pipe 17.

[0039] In addition, 9 is the adjustment bolt of level ****** of a unit.

[0040] Below, the process of the liquid crystal display using the manufacturing installation shown in drawing 1 -2 is explained.

[0041] First, the cassette 6 which contained the glass substrate sent from the last process, for example, a membrane formation process, is laid to the cassette installation section of the automatic-loader-and-unloader section 1.

[0042] The laid glass substrate of the cassette 6 interior is conveyed in the direction of an arrow head 19 by the handling robot 10, and is sent to the scrubber section 11.

[0043] Conveyance actuation of the glass substrate by the handling robot 10 A glass substrate specifically lengthens (1) robot arm A caudad. (2) Its (3) robot arm A which makes the robot arm A carry out vacuum adsorption of the glass substrate is drawn in. Move a glass substrate to the interior of a jet pipe 17 from the partition of the automatic-loader-and-unloader section 1. (4) It is performed by the procedure of lengthening (5) robot arm A, canceling the after vacuum adsorption, and making a glass substrate lay in the scrubber section 11 interior of moving the handling robot 10 to the direction of an arrow head 19, i.e., the back of the scrubber section 11.

[0044] In the scrubber section 11, a mohair brush etc. removes the foreign matter on a glass substrate, subsequently a glass substrate is moved in the direction of an arrow head 20 like the above-mentioned conveyance actuation using the handling robot 10, and it conveys to a dryer part 12.

[0045] Next, a glass substrate is completely dried with a hot plate etc. by the dryer part 12, and it is made to move in the direction of an arrow head 21 like the above-mentioned conveyance actuation using the handling robot 10, and conveys to the coater section 13.

[0046] Furthermore, it is a centrifugal force about a photopolymer on a glass substrate in the coater section 13, for example, applies to about 5000A in thickness.

[0047] Using the handling robot 10, like the above-mentioned conveyance actuation, it is made to move in the direction of an arrow head 22, and the glass substrate which spreading completed is conveyed to the BEKU section 14.

[0048] In this BEKU section 14, the photopolymer on a glass substrate is BEKU and stiffened with a hot plate etc.

[0049] Above, a series of manufacture processings in the manufacturing installation of drawing 1 are completed. The glass substrate which carried out the completion of manufacture is conveyed by the handling robot 10 in order of arrow heads 23, 24, and 25, and is again contained in the cassette 6 of the automatic-loader-and-unloader section 1 by him.

[0050] In addition, although the drugs which contained the organic component in each processing unit are used as mentioned above while having performed each processing to the glass substrate As opposed to said all processing units 11-15 and the automatic-loader-and-unloader section 1 With the blower (not shown) in which the air defecated by the filter unit 16 from the upper part was supplied, and the air inside a processing unit was prepared from the lower part to the jet-pipe 17 interior For example, since it is made to exhaust by about [-40--80Pa] exhaust gas pressure and air is discharged to the clean room exterior through a jet pipe 17 and the communicating tube 18, an organic component etc. is not spread inside a clean room.

[0051] Moreover, although said especially example explained the process of a liquid crystal display including a photography process, it cannot be overemphasized by changing suitably the number of processing units, arrangement, especially a number of stages, etc. also about a process including the process which this invention is not limited to this and needs the processing unit of many, such as wet down stream processing or a glass substrate cure process, that it can carry out.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the mimetic diagram showing the configuration of one example of the manufacturing installation of this invention.
[Drawing 2] Drawing 2 is the II-II line sectional view of drawing 1 .
[Drawing 3] It is the transverse-plane explanatory view of the conventional manufacturing installation for liquid crystal displays.
[Description of Notations]
1 Automatic-Loader-and-Unloader Section
6 Cassette
10 Handling Robot
11 Processing Unit (Scrubber Section)
12 Processing Unit (Dryer Part)
13 Processing Unit (Coater Section)
14 Processing Unit (BEKU Section)
15 Processing Unit (Buffer Section)
16 Filter Unit
17 Jet Pipe
18 Communicating Tube

[Translation done.]

* NOTICES *

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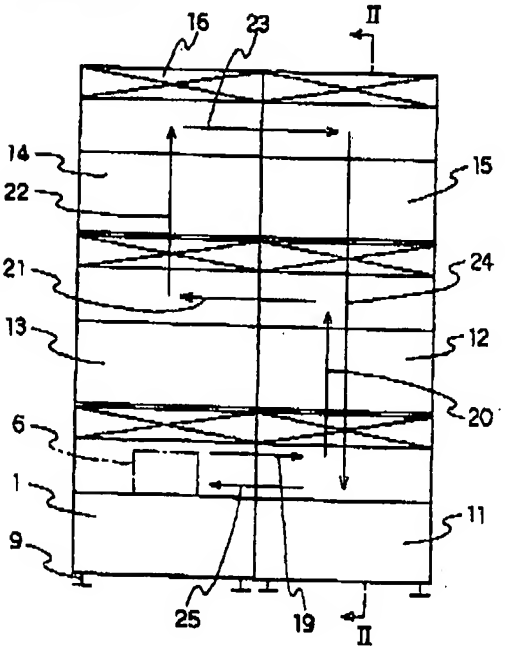
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

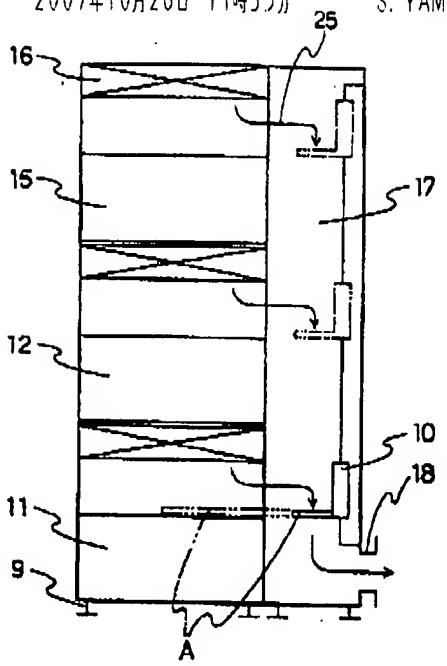
DRAWINGS

[Drawing 1]



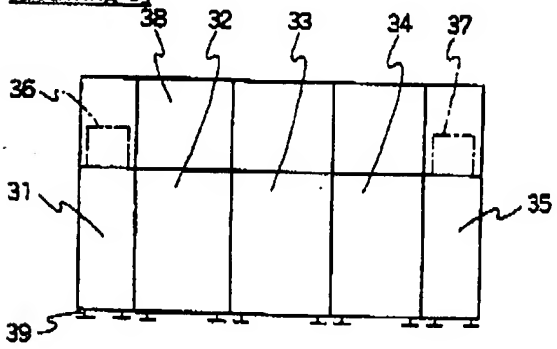
1 ローダ・アンローダ部
6 カセット
11 処理ユニット（スクラバー部）
12 処理ユニット（乾燥部）
13 処理ユニット（コータ部）
14 処理ユニット（ベーク部）
15 処理ユニット（バッファ部）
16 フィルターユニット

[Drawing 2]



10 ハンドリングロボット
11 処理ユニット（スクラバー部）
12 処理ユニット（乾燥部）
15 処理ユニット（バッファ部）
16 フィルターユニット
17 排気ダクト
18 連通管

[Drawing 3]



[Translation done.]

(19)日本国特許庁（ＪＰ） (12) 公開特許公報（A） (11)特許出願公開番号

特開平9－15547

(43)公開日 平成９年(1997)１月17日

(51)Int.Cl.[6]		識別記号	庁内整理番号	FI			技術表示箇所
G02F	1/13	101		G02F	1/13	101	
G09F	9/00	338	7426－5H	G09F	9/00	338	

審査請求 未請求 請求項の数２ ＯＬ （全 6 頁）

(21)出願番号 特願平7－165339

(22)出願日 平成７年(1995)６月30日

(71)出願人 595059056
株式会社アドバンスト・ディスプレイ
熊本県菊池郡西合志町御代志997番地

(72)発明者 藤沢 正人
熊本県菊池郡西合志町御代志997番地 株式会社アドバンスト・ディスプレイ内

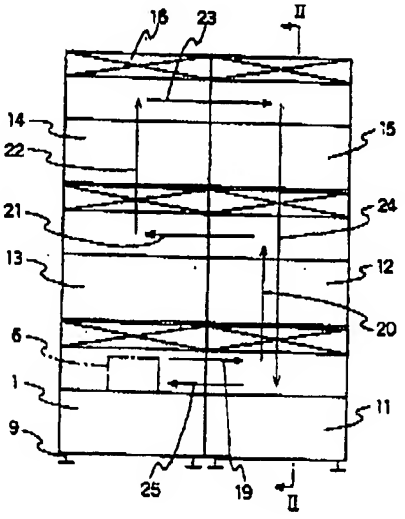
(74)代理人 弁理士 朝日奈 宗太 （外３名）

(54)【発明の名称】 液晶表示装置の製法およびそれに用いる製造装置

(57)【要約】

【目的】 各処理ユニットを立体的に配置することにより、省スペース化を達成し、しかも清浄度の低下を抑制し、さらに動力付帯工事の低コスト化を図ることができる液晶表示装置の製法およびそれに用いる製造装置を提供する。

【構成】 立体配置された複数個の処理ユニットのうちの少なくとも１個の処理ユニットにおいて、ガラス基板に処理を施しているあいだ、すべての処理ユニットに対して、上方から清浄化された空気を供給し、下方から処理ユニット内部の空気をクリーンルーム外部へ排出し、かつ前記処理ユニットにおける処理が完了したのち、前記ガラス基板をつぎの処理を行うための処理ユニットへ、垂直または水平方向に移動せしめることを特徴とする液晶表示装置の製法。



1 ローダ・アンローダ部
6 カセット
11 処理ユニット（スクラバー部）
12 処理ユニット（乾燥部）
13 処理ユニット（コータ部）
14 処理ユニット（ベーク部）
15 処理ユニット（バッファ部）
16 フィルターユニット

1

【特許請求の範囲】

【請求項1】 クリーンルーム内部における、少なくとも2段以上立体的に配置されかつ垂直方向または水平方向に沿って隣接した2つの処理ユニットのあいだが連通されてなる製造装置を用いた、液晶表示装置の製法であって、

少なくとも1個の処理ユニットにおいて、ガラス基板に処理を施しているあいだ、すべての処理ユニットに対して、上方から清浄化された空気を供給し、下方から処理ユニット内部の空気をクリーンルーム外部へ排出し、かつ前記処理ユニットにおける処理が完了したのち、前記ガラス基板をつぎの処理を行うための処理ユニットへ、垂直または水平方向に移動せしめることを特徴とする液晶表示装置の製法。

【請求項2】 クリーンルーム内部に配設される、複数の処理ユニットを有する液晶表示装置用の製造装置であって、（1）前記処理ユニットは、少なくとも2段以上立体的に配置され、垂直方向または水平方向に沿って隣接した2つの処理ユニットのあいだが連通されており、かつ最上段の処理ユニットの上部が開放されており、（2）前記処理ユニットのそれぞれの上部には、処理ユニット内部の空気を清浄にするためのフィルターユニットが設けられており、（3）前記処理ユニットの後方側には、それぞれの処理ユニットに連通する排気ダクトが配設されており、（4）該排気ダクト内部には前記処理ユニット間をガラス基板を搬送するためのハンドリングロボットが移動自在に配設されており、（5）前記排気ダクトの背面下部には排気ダクト内部をクリーンルーム外部へ連通せしめる連通管が接続されてなることを特徴とする液晶表示装置用の製造装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は液晶表示装置の製法およびそれに用いる製造装置に関する。さらに詳しくは、複数個の処理ユニットを立体配置することにより、省スペース化を達成することができる液晶表示装置の製法およびそれに用いる製造装置に関する。

【0002】

【従来の技術】従来より、液晶表示装置を製造するばあい、フォトグラフィー工程などの複数工程の処理をガラス基板に施している。

【0003】図3は従来の液晶表示装置を製造するための製造装置の正面説明図であり、この製造装置は、複数の処理ユニット32～34が水平に配置され、隣接する2つの処理ユニット同士が互いに連通されることにより構成されている。

【0004】図3において、31はローダ部でカセット載置部とカセット内のガラス基板を取り出すためのハンドリングロボット（図示せず）を具備している。このハンドリングロボットは、処理ユニット32～34のそれぞれの後方側を水平移動できるようになっている。

2

【0005】ここで、処理ユニット32～34は、たとえば、32はスクラバー・乾燥部で、ガラス基板表面の異物を除去し、さらにガラス基板の乾燥も行ない、33はコータ部で、ガラス基板上に感光性樹脂を回転塗布し、34はベーク部で、ホットプレートを有しており、このホットプレートにより、ガラス基板上の感光性樹脂を硬化させる。

【0006】35はアンローダ部で、プロセス処理の終わったガラス基板をローダ部と同様にカセット載置部とカセット内にガラス基板を収納するハンドリングロボット（図示せず）を具備している。

【0007】36、37はガラス基板を収納するカセットで、38は防塵用透明カバーである。

【0008】39はユニットのレベル出し用、すなわち高さ調節用のアジャストボルトである。

【0009】つぎに、図3の製造装置を用いた液晶表示装置の製法について順に説明する。

【0010】まず、前記製造装置にくる直前の前工程、たとえば、成膜工程から送られたガラス基板を収納したカセット36をローダ部31のカセット載置台に載置する。

【0011】つぎに、載置されたカセット36内のガラス基板をハンドリングロボットで1枚ずつ取り出し、スクラバー・乾燥部32へ搬送する。

【0012】このスクラバー・乾燥部32では、まずスクラバー部でガラス基板をチャック（図示せず）により把持し、ついで、たとえばモヘアブラシなどでガラス基板上の異物を除去し、そののち乾燥部でガラス基板を乾燥させる。

【0013】つぎに、乾燥されたガラス基板を、装置内の搬送機構によって、コータ部33へ送り、ガラス基板上に感光性樹脂をたとえば厚さ5000オングストローム程度に回転塗布する。

【0014】さらに、感光性樹脂を塗布したガラス基板を、ベーク部34へ送り、ホットプレートなどでベークして硬化させる。

【0015】最後に、硬化が完了したガラス基板を、アンローダ部35へ送り、ハンドリングロボットでカセット37内に1枚ずつ収納する。

【0016】

【発明が解決しようとする課題】しかしながら、前記液晶表示装置の製法では、ガラス基板を水平に搬送して順次処理ユニット32～34で処理を施しているため、以下の（1）～（3）の問題がある。

【0017】（1）前記製造装置が収容されたクリーンルームにおいて、当該製造装置の占有面積が大きくなり、その結果、クリーンルームが大型化し、それに伴いクリーンルームのランニングコストが増大する。

【0018】（2）前記製造装置の外周部は、防塵カバ

ーのみで仕切られているため、各ユニットで使用する有機成分がクリーンルーム内に拡散し、当該クリーンルームの清浄度を低下させる。

【0019】（3）各処理ユニットが水平に構成されているため、たとえば排気設備の接続工事のばあい、各ユニット毎に排気管および排気用の動力源などを接続するため、動力付帯工事が高価になる。

【0020】本発明は、かかる問題を解消するためになされたものであり、各処理ユニットを立体的に配置することにより、省スペース化を達成し、しかも清浄度の低下を抑制し、さらに動力付帯工事の低コスト化を図ることができる液晶表示装置の製法およびそれに用いる製造装置を提供することを目的とする。

【0021】

【課題を解決するための手段】本発明の液晶表示装置の製法は、クリーンルーム内部における、少なくとも2段以上立体的に配置されかつ垂直方向または水平方向に沿って隣接した2つの処理ユニットのあいだが連通されてなる製造装置を用いた、液晶表示装置の製法であって、少なくとも1個の処理ユニットにおいて、ガラス基板に処理を施しているあいだ、すべての処理ユニットに対して、上方から清浄化された空気を供給し、下方から処理ユニット内部の空気をクリーンルーム外部へ排出し、かつ前記処理ユニットにおける処理が完了したのち、前記ガラス基板をつぎの処理を行うための処理ユニットへ、垂直または水平方向に移動せしめることを特徴とする。

【0022】また、本発明の液晶表示装置用の製造装置は、クリーンルーム内部に配設される、複数の処理ユニットを有する液晶表示装置用の製造装置であって、

（1）前記処理ユニットは、少なくとも2段以上立体的に配置され、垂直方向または水平方向に沿って隣接した2つの処理ユニットのあいだが連通されており、かつ最上段の処理ユニットの上部が開放されており、（2）前記処理ユニットのそれぞれの上部には処理ユニット内部の空気を清浄にするためのフィルターユニットが設けられており、（3）前記処理ユニットの後方側には、それぞれの処理ユニットに連通する排気ダクトが配設されており、（4）該排気ダクト内部には前記処理ユニット間をガラス基板を搬送するためのハンドリングロボットが移動自在に配設されており、（5）前記排気ダクトの背面下部には、排気ダクト内部をクリーンルーム外部へ連通せしめる連通管が接続されてなることを特徴とする。

【0023】

【作用】本発明によれば、複数個の処理ユニットを立体的に配置することにより、当該液晶表示装置の占有面積を大幅に縮小することができる。

【0024】また、各処理ユニットの空気の出入をみたばあい、まず、空気をフィルターユニットを通過させることによって清浄化させたのち、最上段の処理ユニットへ供給し、ついで、供給された空気の少なくとも一部を

下方からフィルターユニットを介して下段の処理ユニットへ供給する。そののち、最下段の処理ユニットなどから排出された空気のすべてを連通管を介してクリーンルーム外部へ排出する。したがって、クリーンルームの空気を汚さない。

【0025】

【実施例】つぎに、図面を参照しながら、本発明の液晶表示装置の製法およびそれに用いる製造装置を詳細に説明する。図1は本発明の製造装置の一実施例の構成をポす模式図、図2は図1のII－II線断面図である。

【0026】図1～2に示される液晶表示装置用の製造装置は、その内部が大きく分けて6つのスペースに区画されている。すなわち、1段につき2区画を垂直方向に3段重ねて構成されている。これらの区画のうち、図1中の左列最下段の区画は、ローダ・アンローダ部1であり、カセット6が載置可能な構造になっている。その他の5つの区画は処理ユニット11～15であり、各処理ユニットの詳細については後述する。

【0027】また、ローダ・アンローダ部1および処理ユニット11～15は垂直方向または水平方向に沿って隣接した2つの処理ユニットのあいだ（またはローダ・アンローダ部と処理ユニットとのあいだ）が連通され、かつ最上段の処理ユニット14および15の上部が開放されている。ローダ・アンローダ部1および処理ユニット11～15のそれぞれの上部には、処理ユニット内部に供給される空気を清浄にするためのフィルターユニット16が設けられている。

【0028】そして、図2に示されるように、前記ローダ・アンローダ部1および処理ユニット11～15の後方側には、ローダ・アンローダ部1および処理ユニット11～15のそれぞれと連通する排気ダクト17が設けられている。この排気ダクト17内部には、前記ローダ・アンローダ部1および処理ユニット11～15のあいだをガラス基板を搬送するためのハンドリングロボット10が移動可能に配設されている。

【0029】前記排気ダクト17の背面下部には、排気ダクト17内部をクリーンルーム外部へ連通せしめるための連通管18が設けられている。

【0030】ハンドリングロボット10は、排気ダクト17の内部を垂直方向および水平方向の両方について移動できるようになっており、しかも伸縮自在のロボットアームAの適宜の位置に設けられた真空チャックなどを用いてガラス基板を真空吸着することにより、各処理ユニット間のガラス基板の移動を可能にするように構成されている。

【0031】前記処理ユニット11～15には、具体的には、以下のユニットがそれぞれ配設される。

【0032】11はスクラバー部であり、ガラス基板上の異物を除去する。

【0033】12は乾燥部であり、ホットプレートなど

で、ガラス基板を乾燥させる。

【0034】13は感光性樹脂塗布部（コータ部）であり、ガラス基板を高速回転させたときに生じる遠心力を利用してガラス基板上に、たとえば厚さ5000オングストローム程度の感光性樹脂を塗布する。

【0035】14はベーク部であり、ホットプレート上でガラス基板に塗布された感光性樹脂をベークし硬化させる。

【0036】15はバッファ部であり、作製される液晶表示装置の仕様によって必要な処理ユニットを付加することができる。このバッファ部15に付加される処理ユニットとして、たとえば、ハードベークが必要なばあいの前記ベーク部14の他にさらにもう1つの高温用ホットプレートユニット、または次工程で用いられるカセットへガラス基板を移しかえるためのユニットなどがあげられる。

【0037】また、各処理ユニットなどの上部に取り付けられフィルターユニット16は、処理ユニット内部の清浄度を、クラス10などの所定の基準に保つことができる仕様になっている。とくに、フィルターユニット16として、HEPA（High Efficiency Particulate Absolute）フィルターを用いれば、高い清浄度を達成することができる。しかもHEPAフィルタを用いるばあい、通常、風速が0．4～0．5m／秒程度で吹き出しているため、各処理ユニットの入口（排気ダクト17に面する後部開口）にエアカーテンを作るため外部空気の誘引を防止することができる。

【0038】排気ダクト17は各処理ユニット内部の、MMP（Methyl 3－methoxy propionate）シンナーまたはレジスト材料などの薬剤に含まれる有機成分を含む空気を連通管18を介してクリーンルーム外部へ排気するようになっている。また、排気ダクト17は、ハンドリングロボット10のためのカバーとしての役目も果たしている。

【0039】なお、9は、ユニットのレベル出し用のアジャストボルトである。

【0040】つぎに、図1～2に示される製造装置を用いた液晶表示装置の製法について説明する。

【0041】まず、前工程、たとえば、成膜工程から送られたガラス基板を収納したカセット6をローダ・アンローダ部1のカセット載置部へ載置する。

【0042】載置されたカセット6内部のガラス基板はハンドリングロボット10によって、矢印19の方向に搬送され、スクラバー部11へ送られる。

【0043】ハンドリングロボット10によるガラス基板の搬送動作は、具体的には、（1）ロボットアームAをガラス基板の下方に伸ばす、（2）ガラス基板をロボットアームAに真空吸着させる、（3）ロボットアームAを縮めて、ガラス基板をローダ・アンローダ部1の区

画から排気ダクト17の内部へ移動させる、（4）ハンドリングロボット10を矢印19の方向、すなわちスクラバー部11の後方へ移動させる、（5）ロボットアームAをのばし、そののち真空吸着を解除してガラス基板をスクラバー部11内部に載置させるという手順で行われる。

【0044】スクラバー部11では、モヘアブラシなどでガラス基板上の異物を除去し、ついでハンドリングロボット10を用いて、前述の搬送動作と同様にしてガラス基板を矢印20の方向に移動させ、乾燥部12へ搬送する。

【0045】つぎに、乾燥部12でホットプレートなどでガラス基板を完全に乾燥し、ハンドリングロボット10を用いて、前述の搬送動作と同様にして、矢印21の方向へ移動させ、コータ部13へ搬送する。

【0046】さらに、コータ部13でガラス基板上に感光性樹脂を遠心力で、たとえば厚さ5000オングストローム程度に塗布する。

【0047】塗布の完了したガラス基板は、ハンドリングロボット10を用いて、前述の搬送動作と同様にして、矢印22の方向へ移動させ、ベーク部14へ搬送する。

【0048】このベーク部14では、ホットプレートなどでガラス基板上の感光性樹脂をベークし硬化させる。

【0049】以上で、図1の製造装置内における一連の製造処理は完了する。製造完了したガラス基板は、ハンドリングロボット10により、矢印23、24、25の順に搬送され、ローダ・アンローダ部1のカセット6内に再び収納される。

【0050】なお、前述のように、ガラス基板にそれぞれの処理を施しているあいだ、各処理ユニットで有機成分を含んだ薬剤を使用するが、すべての前記処理ユニット11～15およびローダ・アンローダ部1に対して、上方からフィルターユニット16によって清浄化された空気を供給し、下方から処理ユニット内部の空気を排気ダクト17内部に設けられた送風機（図示せず）により、たとえば－40～－80Pa程度の排気圧力で排気させ、排気ダクト17および連通管18を介してクリーンルーム外部へ空気を排出するので、クリーンルーム内部に有機成分などが拡散することがない。

【0051】また、前記実施例では、とくにフォトグラフィ工程を含む液晶表示装置の製法について説明したが、本発明はこれに限定されるものではなくウェット処理工程またはガラス基板キュア工程などのような、多くの処理ユニットを必要とする工程を含む製法についても適宜、処理ユニットの数、配置、とくに段数などを適宜変更することにより、実施可能であることはいうまでもない。

【0052】

【発明の効果】以上述べたごとく、本発明においては各

処理ユニットを立体的に配置し、かつ処理ユニットの後方側に配設された排気ダクトを用いて排気している。これにより、つぎのような効果がえられる。

【0053】（1）クリーンルーム内での装置の占有面積が大幅に縮小できるため、クリーンルームも小型化することができ、その結果、クリーンルームのランニングコストを削減することができる。

【0054】（2）各処理ユニットを排気ダクトで排気しているため、有機成分がクリーンルーム内に拡散することがなく、クリーンルームの清浄化の低下を抑制することができる。

【0055】（3）各処理ユニットを一定の外形寸法にして、いわば標準化を達成することができるため、製造装置の価格を安価にすることができる。

【0056】（4）各処理ユニットが立体に配置されているため、2次側付帯動力工事、具体的には、有機成分を排気するための排気設備の接続工事のばあい、各処理ユニットの後方側が共通の排気ダクトに接続されているため、排気ダクトに1箇所だけ送風機などの排気用の動力源を接続すれば、全処理ユニットの排気ユニットが可＊

＊能になるため、工事のコストが安価になる。

【図面の簡単な説明】

【図1】本発明の製造装置の一実施例の構成を示す模式図である。

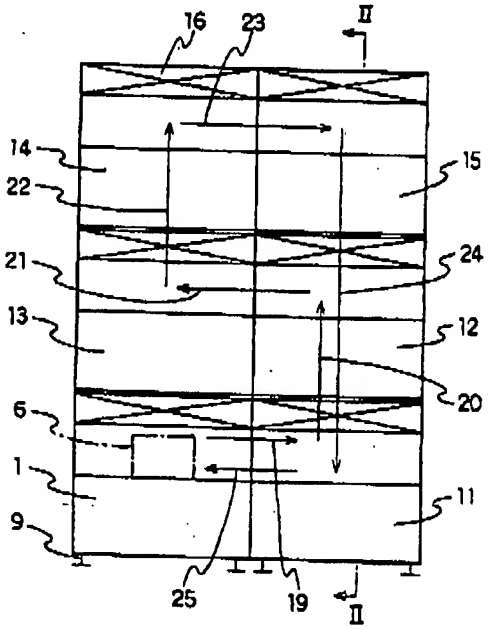
【図2】図2は図1のII－II線断面図である。

【図3】従来の液晶表示装置用製造装置の正面説明図である。

【符号の説明】

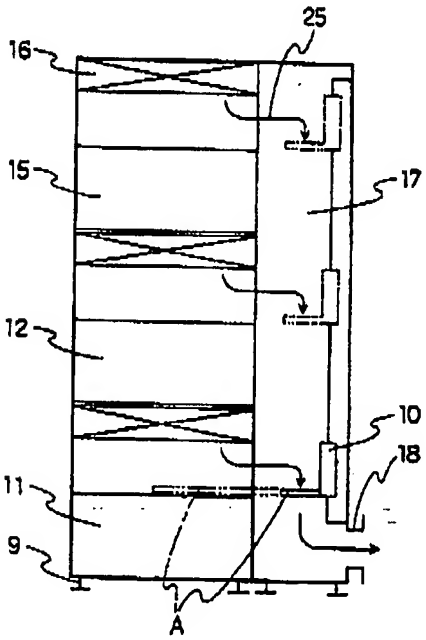
1　ローダ・アンローダ部
6　カセット
10　ハンドリングロボット
11　処理ユニット（スクラバー部）
12　処理ユニット（乾燥部）
13　処理ユニット（コータ部）
14　処理ユニット（ベーク部）
15　処理ユニット（バッファ部）
16　フィルターユニット
17　排気ダクト
18　連通管

【図1】



1　ローダ・アンローダ部
6　カセット
11　処理ユニット（スクラバー部）
12　処理ユニット（乾燥部）
13　処理ユニット（コータ部）
14　処理ユニット（ベーク部）
15　処理ユニット（バッファ部）
16　フィルターユニット

【図2】



10　ハンドリングロボット
11　処理ユニット（スクラバー部）
12　処理ユニット（乾燥部）
15　処理ユニット（バッファ部）
16　フィルターユニット
17　排気ダクト
18　連通管

【図3】